

PHYSICS

Physics Department (<http://www.csuchico.edu/physics/>)
 Science Building 257A
 530-898-6259
 Email: phys@csuchico.edu
 Chair: Eric J. Ayars

Insight

The Department of Physics offers excellent education in the field of physics. Whether your career goal is teaching, working in technology or scientific research, or daring to make the next great breakthrough in our understanding of the universe, we offer a physics degree tailored to your dreams.

Experience

Our goal is to provide the best undergraduate education in physics. By choice, we don't have a graduate program! Instead, we are focused on our undergraduates. All of our classes are taught by professors selected for their commitment to quality teaching. No massive lecture halls full of stadium seating in this major; instead, your core physics courses are capped at 36 seats. This allows for quality mentorship and individualized instruction.

We offer hands-on research, both during the school year and during our Physics Summer Research Investigations (PSRI) program. Current research experiences available to our students include instrumentation development, stellar formation, femtosecond spectroscopy, ultra-cold atoms, lasers and optics, quantum sensing, and computational modeling of the solar interior.

We have an active Society of Physics Students chapter and a brand-new science building.

Outlook

Our students go on to careers in research, teaching, industry, programming, entrepreneurship... Want specifics? Look at any cell tower. See devices with a lightning-bolt logo? That company was started by a California State University, Chico physics grad. Another recent graduate built a lab company that tests commercial devices for (UL) certification. Another does massively-parallel computation development for Nvidia.

We regularly have students go on to doctoral work at major universities, and our campus is the primary source of high school science teachers for the entire Northern California.

Programs

Undergraduate

Bachelor's

- Physics BS (<https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/physics/physics-bs/>)

Minors

- Physics Minor (<https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/physics/physics-minor/>)

Credentials

- Physics Single Subject Matter Preparation Program (<https://catalog.csuchico.edu/colleges-departments/college-natural-sciences/physics/physics-single-subject-matter-preparation-program/>)

See Course Description Symbols and Terms (<https://catalog.csuchico.edu/academic-standards-policies/course-description-symbols-terms/>) for an explanation of course description terminology and symbols, the course numbering system, and course credit units.

PHYS 100 Introduction to Astronomy: Survey of the Cosmos

3 Units GE

Typically Offered: Fall and spring

This course provides an overview of modern physical theory, emphasizing the approach of science in understanding our place in the universe. The student discovers how simple, fundamental physical principles enable us to understand key features in diverse physical systems: from the radiometric dating of early hominid ancestors to the measurement of the expansion rate of the Universe. The course emphasizes our current understanding of astronomy, solar system formation, stellar evolution, and cosmic evolution. This in turn leads us to investigate the physical conditions salient to life on Earth, and ways in which these conditions are 'rare'. 2 hours activity, 2 hours discussion. (007392)

General Education: Laboratory Activity (B3); Physical Science (B1)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 3 units

Course Attributes: Lower Division

PHYS 102 Thinking Like a Physicist

1 Unit

Prerequisite: Recommended: For students who have not met other PHYS 202A prerequisites such as MATH 118 or High school trigonometry.

Corequisites: PHYS 202A.

Typically Offered: Fall and spring

This course provides the math and trigonometry background necessary for success in introductory physics. Specifically designed to be taken alongside PHYS 202A for students who have not met other PHYS 202A prerequisites such as MATH 118 or High school trigonometry. 1 hour lecture. (021291)

Grade Basis: Credit/No Credit

Repeatability: You may take this course for a maximum of 1 unit

Course Attributes: Lower Division

PHYS 109 Paths to Success in Physics

1 Unit

Typically Offered: Fall only

A university success course for physics majors new to California State University, Chico. Appropriate for all incoming freshman and transfer students. This course explores academic and career opportunities in physics and related fields, introduces current topics in physics, acquaints students with resources available on campus and provides an introduction to physics research. 1 hour discussion. (021671)

Grade Basis: Graded

Repeatability: You may take this course for a maximum of 1 unit

Course Attributes: Lower Division

- PHYS 202A General Physics I** **4 Units GE**
Prerequisite: High school physics; High school trigonometry, and second-year high school algebra or MATH 118; or concurrent enrollment in PHYS 102.
Typically Offered: Fall and spring
 Mechanics, properties of matter, wave motion, sound, heat. Science majors are encouraged to take PHYS 204A instead of this course. 3 hours discussion, 3 hours laboratory. (007394)
General Education: Laboratory Activity (B3); Physical Science (B1)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division
- PHYS 202B General Physics II** **4 Units**
Prerequisite: PHYS 202A with a grade of C- or higher.
Typically Offered: Fall and spring
 Light, electricity, magnetism, selected topics in modern physics. Science majors are encouraged to take PHYS 204B instead of this course. Algebra and trigonometry are used. 3 hours discussion, 3 hours laboratory. (007395)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division
- PHYS 202X Physics Problem Session** **1 Unit**
Prerequisite: Concurrent enrollment in PHYS 202A.
Typically Offered: Fall and spring
 Designed to supplement PHYS 202A with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007398)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division
- PHYS 202Y Physics Problem Session** **1 Unit**
Corequisites: PHYS 202B.
Typically Offered: Fall and spring
 Designed to supplement PHYS 202B with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007399)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division
- PHYS 204A Physics for Students of Science and Engineering: Mechanics** **4 Units GE**
Prerequisite: High school physics or faculty permission. Concurrent enrollment in or prior completion of MATH 121 (second semester of calculus) or equivalent.
Typically Offered: Fall and spring
 Vectors, kinematics, particle dynamics, friction, work, energy, power, momentum, dynamics and statics of rigid bodies, oscillations, gravitation, fluids. Calculus used. A grade of C- or higher is required before progressing to either PHYS 204B or PHYS 204C. 3 hours discussion, 3 hours laboratory. (007401)
General Education: Laboratory Activity (B3); Physical Science (B1)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division
- PHYS 204B Physics for Students of Science and Engineering: Electricity and Magnetism** **4 Units**
Prerequisite: MATH 121, PHYS 204A with a grade of C- or higher.
Typically Offered: Fall and spring
 Charge and matter, electric field, Gauss' law, electric potential, capacitors and dielectrics, current and resistance, magnetic field, Ampere's law, Faraday's law of induction, magnetic properties of matter, electromagnetic oscillations and waves. Calculus used. 3 hours discussion, 3 hours laboratory. (007402)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division
- PHYS 204C Physics for Students of Science and Engineering: Heat, Wave Motion, Sound, Light, and Modern Topics** **4 Units**
Prerequisite: MATH 121, PHYS 204A with a grade of C- or higher.
Typically Offered: Fall and spring
 Temperature, first and second law of thermodynamics, and kinetic theory. Waves in elastic media, standing waves and resonance, and sound. Ray and wave optics, reflection, refraction, lenses, mirrors, diffraction, and polarization. Selected topics in modern physics. Calculus used. 3 hours discussion, 3 hours laboratory. (007403)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Lower Division
- PHYS 204X Physics Problem Session** **1 Unit**
Corequisites: PHYS 204A.
Typically Offered: Fall and spring
 Designed to supplement PHYS 204A with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007406)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division
- PHYS 204Y Physics Problem Session** **1 Unit**
Corequisites: PHYS 204B.
Typically Offered: Fall and spring
 Designed to supplement PHYS 204B with additional applications of introductory physics. Provides the student with the opportunity for additional assistance in developing problem-solving abilities. 2 hours activity. (007407)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Lower Division
- PHYS 298 Special Topics** **1-3 Units**
Prerequisite: Department permission.
Typically Offered: Fall and spring
 This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 3 hours supervision. (007412)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Lower Division

- PHYS 300 Introduction to Modern Physics: Relativity and Quantum Theory** 3 Units
Prerequisite: PHYS 204A, PHYS 204B, PHYS 204C, or PHYS 202A and PHYS 202B and calculus with faculty permission.
Typically Offered: Fall only
 This course focuses on the radical changes in our conception of the physical world that emerged in the early 20th and 21st centuries. The course begins with the theory of special relativity, which altered our understanding of the nature of space, time, matter, and energy. The course's middle section is devoted to the introduction of quantum theory. The last section introduces particle physics, general relativity, and cosmology. 2 hours activity, 2 hours discussion. (007417)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 301 Analytical Mechanics** 3 Units
Prerequisite: PHYS 204B, PHYS 204C, PHYS 314 (may be taken concurrently).
Typically Offered: Fall only
 Newton's laws of motion, particle dynamics, accelerated reference systems, central force problems, conservation laws, celestial mechanics, many body systems, rotational motion, rigid body dynamics, Euler's equations, Lagrange's and Hamilton's formulations, oscillating systems, and waves. 3 hours discussion. (007419)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 302 Electricity and Magnetism** 3 Units
Prerequisite: PHYS 204C, PHYS 314.
Typically Offered: Spring only
 Vector analysis; electrostatic fields and potentials: Poisson's equation, boundary value problems and multipole expansions; dielectrics, magnetostatics, magnetic fields in matter, Maxwell's equations, field energy and momentum, Fresnel equations, propagation of electromagnetic waves in dispersive media, waveguides and coaxial cables, radiating systems. 3 hours discussion. (007422)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 307 Physics of Music** 3 Units GE
Prerequisite: GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Physical Sciences (B1); GE Life Sciences (B2); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
 This course is intended for non-science majors and explores the deep connection between physics and music. Basic principles of physics and scientific reasoning are taught in the context of the production and perception of music, emphasizing the historic and scientific interplay between physics and music. No previous knowledge of physics or music is assumed. Through learning the physical concepts used to describe music, students are able to extend their understanding to additional examples of physical phenomena. 3 hours lecture. (021877)
General Education: Upper-Division Scientific Inq/Quant Reason (UDB); Innovation, Design, and the Arts Pathway; Science, Technology, and Society Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 309 Physics Associates Program** 1 Unit
Prerequisite: Faculty permission.
Typically Offered: Fall and spring
 The course provides two hours/week of physics tutoring. 2 hours activity. (007429)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division
- PHYS 312 Computational Physics** 3 Units
Prerequisite: PHYS 204B.
Corequisites: PHYS 204C.
Typically Offered: Spring only
 This course prepares physics majors to be self-sufficient in personal computer use to solve experimental and theoretical physics problems. Topics include, but are not limited to, analysis of experimental data, projectile motion, random processes, vector fields and potentials, vibrating systems, and electric circuits. 2 hours discussion, 3 hours laboratory. (007411)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 314 Methods of Theoretical Physics** 3 Units
Prerequisite: MATH 220, MATH 260, PHYS 204B.
Typically Offered: Fall only
 This course provides students with the skills needed to apply advanced topics in mathematics to upper-division physics problems. It focuses on applications of calculus, multi-variable calculus, differential equations, linear algebra, Fourier techniques, partial differential equations, and boundary-value problems to physics problems in classical mechanics, EM, and other advanced physics courses. 3 hours lecture. (022045)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 315 Thermal Physics** 3 Units
Prerequisite: PHYS 300. Recommended: MATH 361.
Typically Offered: Spring only
 This course develops the laws of macroscopic equilibrium thermodynamics along with applications to representative physical problems. The course concludes with an investigation of the microscopic statistical properties underlying these laws. 3 hours discussion. (021447)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 327 Electronics for Scientists** 4 Units
Prerequisite: PHYS 204B, PHYS 204C.
Typically Offered: Spring only
 This course is an introduction to basic laboratory electronics for scientists. Topics include fundamentals of linear and non-linear circuit elements, operational amplifiers, simple digital circuits, A/D and D/A conversion, noise reduction, introductory-level LabVIEW programming, and an introduction to microcontroller systems. A weekly three hour lab gives students experience in designing, building, and debugging circuitry for laboratory/control tasks. 3 hours laboratory, 3 hours lecture. (021423)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 4 units
Course Attributes: Upper Division

- PHYS 341 Advanced Inquiry into Physics** **3 Units**
Prerequisite: SCED 141; or PHYS 100; or PHYS 202A and PHYS 202B; or PHYS 204A, PHYS 204B, and PHYS 204C.
Typically Offered: Fall and spring
 This course builds on concepts developed in the introductory physics course in greater mathematical and representational sophistication. There is a significant emphasis on participation in and reflection on scientific inquiry. Topics addressed include kinematics, electrostatics and electrodynamics, simple machines, and wave phenomena. 4 hours activity, 1 hour discussion. (020986)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 376W War and Peace in the Nuclear Age (W)** **3 Units GE, W**
Prerequisite: GE Oral Communication (A1); GE Written Communication (A2); GE Critical Thinking (A3); GE Mathematics/Quantitative Reasoning (B4) requirements, or consent of the instructor.
Typically Offered: Fall and spring
 This course explores the fundamentals of nuclear physics, and how these fundamentals give rise to energy release in both bombs and power plants. The course also focuses on how the nature of nuclear physics has influenced international relations. One main goal for students is to understand the scientific issues sufficient to make intelligent choices as citizens. 3 hours lecture. (007363)
General Education: Upper-Division Scientific Inq/Quant Reason (UDB); Equity, Ethics, and Policy Pathway; Global Studies Pathway
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course
- PHYS 398 Special Topics** **1-3 Units**
Typically Offered: Spring only
 This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 1 hour lecture. (007415)
Grade Basis: Graded
Repeatability: You may take this course more than once
Course Attributes: Upper Division
- PHYS 399 Special Problems** **1-3 Units**
Typically Offered: Fall and spring
 This course is an independent study of special problems offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007416)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 6 units
Course Attributes: Upper Division
- PHYS 427W Advanced Laboratory (W)** **3 Units W, GW**
Prerequisite: GE Written Communication (A2) requirement, PHYS 300, PHYS 327.
Typically Offered: Fall only
 Experiments involving atomic and nuclear physics, measurement of physical constants, chaos, solid-state physics, and general-purpose laboratory skills techniques including computerized data collection and analysis. 2 hours discussion, 3 hours laboratory. (007437)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division; Writing Course; Graduation Writing Assessment
- PHYS 435A Quantum Mechanics I** **3 Units**
Prerequisite: PHYS 300; either PHYS 314 or MATH 361.
Typically Offered: Fall only
 A survey of one-dimensional and three-dimensional solutions to Schrodinger's equation designed to build an understanding of commutator algebra and Hilbert space. Formalisms associated with angular momentum and spin are included. 1 hour activity, 2 hours discussion. (007441)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 435B Quantum Mechanics II** **3 Units**
Prerequisite: PHYS 435A.
Typically Offered: Spring only
 This course extends the use of Schrodinger's equation with a variety of approximation methods to study physical systems including atomic physics, nuclear structure, and scattering problems. 3 hours discussion. (007444)
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 450 Optics** **3 Units**
Prerequisite: PHYS 204A, PHYS 204B, PHYS 204C.
Typically Offered: Fall only
 Geometrical and physical optics, interference, diffraction, reflection, dispersion, resolution, polarization, fiber optics, laser optics, and holography. 2 hours discussion, 3 hours laboratory. (002549)
Cross listing(s): EECE 450
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 451 Lasers and Their Applications** **3 Units**
Prerequisite: PHYS 204C. Recommended: EECE 450 or PHYS 450.
Typically Offered: Spring only
 The theory and mechanism of laser action, various types of lasers and their applications and future use. Laboratory involves measurements with lasers, fiber optics, data transmission, and holography. 2 hours discussion, 3 hours laboratory. (002550)
Cross listing(s): EECE 451
Grade Basis: Graded
Repeatability: You may take this course for a maximum of 3 units
Course Attributes: Upper Division
- PHYS 489P Internship in Professional Physics** **3 Units**
Prerequisite: PHYS 300 and faculty permission.
Typically Offered: Fall and spring
 This is a supervised internship in professional physics. This internship may take place at a university, government laboratory, or private sector company. This course may be taken more than once. It cannot be used for the minor in physics. 9 hours supervision. (007447)
Grade Basis: Credit/No Credit
Repeatability: You may take this course for a maximum of 15 units
Course Attributes: Upper Division

PHYS 489T Internship in Physics Teaching 3 Units**Prerequisite:** PHYS 327 and faculty permission.**Typically Offered:** Fall and spring

This is a supervised internship in physics teaching which will take place in a local high school physics classroom. This course may be taken more than once, but a maximum of 3 units of any PHYS 289 may be counted toward the degree. This course cannot be used for the minor in physics. 9 hours supervision. (007448)

Grade Basis: Credit/No Credit**Repeatability:** You may take this course for a maximum of 15 units**Course Attributes:** Upper Division**PHYS 492W Communicating Physics (W) 3 Units W****Prerequisite:** GE Written Communication (A2) requirement, junior standing, open to Physics majors only.**Typically Offered:** Spring only

Presentation and discussion of current physics literature and/or special studies of students and faculty, in professional journal form, other written forms, and in seminar presentation. 2 hours discussion, 1 hour seminar. (022057)

Grade Basis: Graded**Repeatability:** You may take this course for a maximum of 3 units**Course Attributes:** Upper Division; Writing Course**PHYS 498 Special Topics 1-3 Units****Prerequisite:** Upper-division standing in physics, faculty permission.**Typically Offered:** Inquire at department

This course is for special topics offered for 1.0-3.0 units. Typically the topic is offered on a one-time-only basis and may vary from term to term and be different for different sections. See the Class Schedule for the specific topic being offered. 1 hour seminar. (007450)

Grade Basis: Graded**Repeatability:** You may take this course more than once**Course Attributes:** Upper Division**PHYS 499 Special Problems 1-3 Units****Typically Offered:** Fall and spring

This course is an independent study of special problems and is offered for 1.0-3.0 units. You must register directly with a supervising faculty member. 3 hours supervision. (007451)

Grade Basis: Credit/No Credit**Repeatability:** You may take this course for a maximum of 6 units**Course Attributes:** Upper Division**PHYS 697 Independent Study 1-4 Units****Typically Offered:** Fall and spring

This course is a graduate-level independent study offered for 1.0-4.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007456)

Grade Basis: Report in Progress: Graded**Repeatability:** You may take this course for a maximum of 6 units**Course Attributes:** Graduate Division**PHYS 699T Master's Thesis 1-6 Units****Typically Offered:** Fall and spring

This course is offered for 1.0-6.0 units. You must register directly with a supervising faculty member. 9 hours supervision. (007461)

Grade Basis: Report in Progress: CR/NC**Repeatability:** You may take this course for a maximum of 6 units**Course Attributes:** Graduate Division

Assistant Professor

Doctor of Philosophy Univ Of Colorado At Boulder

Eric J Ayars 2003

Chair

Doctor of Philosophy North Carolina St Univ At Raleigh

Eric J Ayars 2003

Professor

Doctor of Philosophy North Carolina St Univ At Raleigh

David T Brookes 2015

Professor

Doctor of Philosophy Rutgers Univ New Brunswick

Kendall P Hall 2021

Assistant Professor

Doctorate Univ Of Wisconsin-Madison

Lynda M Klein 1986

Lecturer

Master of Science Univ Of Cincinnati Main Campus

Yuhfen Lin 2016

Lecturer

Doctor of Philosophy Ohio St Univ Main Campus

Kevin M McLin 2021

Lecturer

Doctor of Philosophy Univ Of Colorado At Boulder

Nicholas J Nelson 2015

Associate Professor

Doctor of Philosophy Univ Of Colorado At Boulder

Sheraz Khan Omarzai 2006

Lecturer

Doctor of Philosophy Univ Of Cal-Santa Cruz

Hyewon K Pechkis 2016

Associate Professor

Doctor of Philosophy Univ Of Connecticut

Joseph A Pechkis 2016

Assistant Professor

Doctor of Philosophy Univ Of Connecticut

Anna I Petrova-Mayor 2008

Professor

Doctor of Philosophy University of Hohenheim

FNU Sushilkumar Sreekumar 2021

Visit Ay

Doctorate Univ Of Texas San Antonio

Mahendra B Thapa 2016

Lecturer

Doctor of Philosophy Univ Of Cincinnati Main Campus

Xueli Zou 2000

Professor

Doctor of Philosophy Ohio St Univ Main Campus

Emeritus Faculty**Cheuk K Chau 1975**

Emeritus

Physics Department**The Faculty**

Paul C Arpin 2014

Doctor of Philosophy Univ Of Illinois Urbana Campus

Eric R Dietz 1983

Professor

Doctor of Philosophy Univ Of Cal-Berkeley

Christopher A Gaffney

Emeritus

Doctor of Philosophy Univ Of Notre Dame

Lorin E Millet 1967

Emeritus

Doctor of Philosophy Brigham Young Univ

Robert L Paulson

Emeritus

Doctor of Philosophy Univ Of Cal-Davis

John C Young 1970

Emeritus

Doctor of Philosophy Univ Of Cal-Davis